

NASA's Impact in Colorado: A Technology Transfer Perspective

You know that NASA studies our planet, our sun, the solar system, and the universe. But did you know that the space program is having an impact here on Earth?

The Technology Transfer Office at **NASA's Johnson Space Center** is dedicated to forming partnerships that can positively contribute to—and benefit from—NASA's research and development (R&D) and technology innovations. Read on to learn more about NASA's impact in Colorado. Or contact us for more information.

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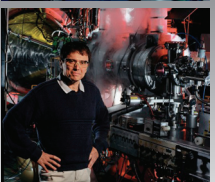
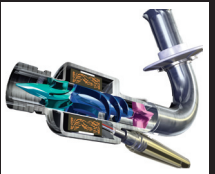
Small Business Innovation Research/Small Business Technology Transfer

The Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR) Program provides an opportunity for small (500 employees or less) high-tech companies to participate in NASA-sponsored R&D efforts in key technology areas. In STTR projects, the businesses partner with a research institution, such as a university.

In the five years between 2003 and 2007, Colorado small businesses received a total of \$26.66 million in SBIR/STTR funding.

The following lists Colorado businesses that received NASA SBIR/STTR contracts between 2003 and 2007. Individual projects lasted between 6 and 24 months with funding ranging from \$70,000 to \$600,000, depending on the year of participation and the type of contract awarded.

| <i>Company</i> | <i>Colorado location</i> | <i>Company</i> | <i>Colorado location</i> |
|---|--------------------------|---------------------------------------|--------------------------|
| ADA Technologies | Littleton | Micro Analysis & Design | Boulder |
| Advanced Solutions | Littleton | MicroSat Systems | Littleton |
| AlphaSniffer | Boulder | Mobile Energy Products | Colorado Springs |
| Atmospheric Observing Systems | Boulder | Perdix | Boulder |
| Barber-Nichols | Arvada | Pioneer Astronautics | Lakewood |
| Black Forest Engineering | Colorado Springs | Quest Product Development Corporation | Wheat Ridge |
| Boulder Nonlinear Systems | Lafayette | Radiometrics Corporation | Boulder |
| Colorado Power Electronics | Fort Collins | Reaction Systems | Golden |
| Composite Technology Development | Lafayette | Redefine Technologies | Golden |
| Cullimore & Ring Technologies | Littleton | RT Logic | Colorado Springs |
| Eltron Research & Development | Boulder | Starsys | Louisville |
| Environmental and Life Support Technologies | Parker | Synkera Technologies | Longmont |
| Extreme Diagnostics | Boulder | sysRAND Corporation | Parker |
| Firestar Engineering | Broomfield | TDA Research | Wheat Ridge |
| Fluid Flow Technologies | Colorado Springs | Technology Applications | Boulder |
| ITN Energy Systems | Littleton | Tech-X Corporation | Boulder |
| Lexycom Technologies | Longmont | TerraMetrics | Littleton |
| Mesoscopic Devices | Broomfield | Vexcel Corporation | Boulder |
| | | Zolo Technologies | Boulder |



More information on the SBIR/STTR Program is available online <http://sbir.nasa.gov>

operational

Spinoffs

Innovative technologies from NASA's space and aeronautics missions can be used in other ways that benefit society. Therefore, NASA is committed to "spinning off" its innovations into new products, as well as providing access to its technologies, facilities, and expertise. The following presents just a few of the Colorado companies that have tapped into NASA technology to develop new products.

| Company | Space-program technology spinoff |
|--|--|
| Aeroponics International Inc. Berthoud | Research aboard the Mir space station led to advances in bio-pharming and the development of an aeroponic system and infection-free plants without the need for pesticides. |
| Aerospace Design and Development Inc. Niwot | Developed for the life-support fuel cell support systems of the Apollo and Space Shuttle programs, the Super-critical Air Mobility Pack (SCAMP®) now is used by rescue personnel. |
| Analytical Spectral Devices Boulder | NASA's Sea-viewing Wide Field-of-view Sensor (SeaWiFS) led the company to create an underwater spectroradiometer system, resulting in two products used for coastal research, such as taking solar irradiance measurements to understand the Earth's climate system. |
| Boulder Imaging Inc. Louisville | A former JPL engineer who constructed imaging instruments for spacecraft invented Acquire Now, software that is embedded in a breast-imaging system, rapidly assessing breast tissue in real-time without uncomfortable compression or harmful radiation. |
| Boulder Nonlinear Systems Lafayette | Spatial light modulator (SLM) technologies developed with SBIR* funding from NASA have found commercial success in medical research, forensics, laser printing/scanning, holography, and laser-beam steering. |
| Coherent Technologies Inc. Louisville | A ground-truth sensor for wake vortex acoustic tests at the Denver airport was developed into WindTracer®, which detects wind hazards and transmits real-time data to air traffic control monitors, used around the world. |
| Comfort Products Ltd. Aspen | The accordion-like corrugations of extravehicular spacesuit joints were adapted for use in ski boots that flex without much distortion and allow greater precision in skiing. The boot warms feet with heating element circuitry from Apollo astronauts' clothing. |
| Cullimore and Ring Technologies Inc. Littleton | NASA's standard software system for thermohydraulic analysis, SINDA/FLUINT, has been widely adapted to pharmaceutical, petrochemical, biomedical, electronics, and energy industries. |
| Outlast Technologies Boulder | Phase-change technology was developed into a line of clothing and bedding that absorbs, stores, and re-releases as needed excess body heat. |

| Company | Space-program technology spinoff |
|--|---|
| SimAuthor Inc. Boulder | Software created for NASA's Aviation Performance Measuring System (APMS) has found new life as FlightViz™, an easy-to-use reconfigurable flight data replay system that provides airline crew training and self-assessment. |
| Sturman Industries Woodland Park | An energy-saving valve-control actuation system for accurately controlling pressurized hydraulic fuel provides the flexibility and precision needed to save energy and reduce emissions in gas engines, using magnetic systems in place of camshafts. |
| Vexcel Corp. Boulder | FotoG™, a close-range photogrammetry software used to extract complex measurements from digital images for projects onboard the International Space Station, is used in X-ray evaluation and forensics. It also was used to create backdrops for a sci-fi film. |
| ZeoponiX Inc. Boulder | A highly productive synthetic soil for sustaining plant growth in space environments was commercialized as ZeoPro™, a fertilizer for golf courses, ball fields, and greenhouses. |

*SBIR: Small Business Innovation Research (see <http://sbir.nasa.gov> for more information on this program)

Partnership Seed Fund Projects

Forming partnerships that add value to NASA is essential to the success of the space program. The NASA Innovative Partnerships Program's (IPP's) Seed Fund provides bridge funding to initiate cost-shared joint-development partnerships. The program leverages funding, resources, and expertise from non-NASA partners, NASA Programs and Projects, and NASA Centers. The following lists just a few of the Colorado organizations that are participating in Partnership Seed Fund projects.

| Partner | Project Title |
|--|---|
| ABSL Space Products Boulder | New Lithium-Ion Batteries with Enhanced Safety and Power Density for Future NASA and Aerospace Missions |
| Ball Aerospace Broomfield | 1. Integrating Sensor Suites and Rover Systems for Surface Prospecting: Enabling In Situ Resource Utilization by Human-Robot Teams 2. Lunar Communication and Navigation Satellite Network Architecture: Internet Protocol, Lasers, and Small Satellites |
| Technology Applications Inc. Boulder | Glass Bubble Insulation for Cryogenic Tanks: A Field Demonstration |
| United Launch Alliance Littleton | Development of a Deployable Sun Shield to Support Long-Duration In-Space Cryogenic Propellant Storage |
| University of Colorado Boulder | Lunar Habitat Wireless Testbed |